

First Workshop of the IERS Special Bureau for Loading

March 4-5, 2002

Luxembourg City, Luxembourg
chaired by T. van Dam and H.-P. Plag

Start of meeting: 4 March 2002, 9:00

End of meeting: 5 March 2002, 15:00

Annotated Agenda

The names associated with each topic indicate those who have volunteered (i.e. been drafted) for leading the discussion. Short presentations addressing the key aspects are welcome.

1. Introduction (van Dam, Plag)

Goal of the workshop, discussion of agenda, topics to be added or deleted?

2. Status of the SBL (van Dam, Plag)

Topics to be addressed include: (1) Status within IERS; (2) Membership and interactions; (3) Current activities; (4) Resources available; (5) Report from the IVS meeting.

3. Scientific agenda:

- Presentation of the SB's (chaired by van Dam)

Here an overview should be given on the products provided to the community and potential synergy of the existing SB's with the new SBL. Where applicable, special emphasis should be on the accuracy as well as spatial and temporal coverage of observations related to surface loads, and/or on potential consistency problems with models used in other SB and the SBL.

- Presentation of the Oceans (Non-tidal) Sub-Bureau: R. Gross
- Presentation of the Oceans (Tidal) Sub-Bureau: R. Ray (presented by van Dam)
- Presentation of the Atmosphere Sub-Bureau: D. Salstein
- Presentation of the Hydrology Sub-Bureau: C. Wilson (presented by van Dam)

- Status of ocean loading (O. Francis)

What are the current approaches and what is the theory, Earth models, ocean tidal models and computational algorithms used? How large are the discrepancies between different approaches? Where do the main discrepancies arise?

- WP1: Status of Earth model's (Plag)

What are the models currently in use and how do they differ? What is the effect of

differences on LLNs? What developments are going on with respect to solid Earth models? Can we realistically expect to have standard laterally heterogeneous models available in the near future? Can we expect a single visco-elastic model for a broad frequency range from sub-diurnal tides to post-glacial rebound?

- WP2: Status on the theory of deformations (Gegout; Plag)
Are there remaining problems with respect to SNREI models (e.g. depth dependency of parameters, elastic moduli)? What can be done with respect to EREI models? How can we handle laterally heterogeneous models? How can the computation with space-dependent and/or time dependent Green's functions be handled?
- WP3: Status with respect to observations of surface loads (all)
Here focus will be on the scientific problems related to surface loads (though there may be some overlap with the respective sub-topic under 4.), in particular, temporal and spatial scales, relative contribution, problems expected with respect to the modelling (e.g. ocean response to air pressure loading; effect of surface topography with respect to pressure loading; how to determine loading anomalies with respect to what mean?). How much modelling is involved in getting the surface mass distribution and surface pressure and how large are model uncertainties? This applies in particular to ocean bottom pressure and continental water storage!
 - Discussion of potential users and their requirements (n.n)
What are the spatial and temporal sampling requirements of the users? The requirements are here defined from the scientific point of view taking into account the spatial and temporal contents of the loading signals.
 - Draft of standards for operational loading computations (van Dam; Plag, Kierulf)
Here the (generic) standards should be briefly outlined from a scientific point of view. The practical points will be considered under 4.
- Discussion of IERS Conventions concerning loading (Plag)
The present status should be summarised with particular emphasis on potential inconsistency with other parts of the conventions, e.g. treatment of polar motion, Earth tides. How can/should the chapter on station motion models be updated?
- Reference Frame issues (Blewitt, Clarke)
What reference frame should the products be generated in? Are there remaining problems in making sure that the ideal reference frames used in the model predictions are in agreement with the reference frames realised through observations? In particular, how does station distribution affect the reference frame realised by the observations?

4. Operational issues

- Discussion of products to be delivered (van Dam; Plag)
A prioritised list of products should be agreed upon. This list depends on the likely initial users, the availability of observational data, and the computational tools available. Therefore, this list should be revisited at the end of point 4.

- Availability of data sets

For the operational products we might want to agree on one observational data set for each load contribution. For research data sets, different loading predictions using data sets might be appropriate. We need to discuss which data sets are in principle available, which of these should be used to generate research data sets, and which should be used for operational classification.

 - Atmospheric

What is the time delay in obtaining the pressure fields (observational versus forecast)? Is the time delay/accuracy tradeoff acceptable for the users? Which data sets should be used for research products?

 - * NCEP/NMC (Salstein)
 - * ECMWF (Gegout)
 - Ocean
 - * Tidal Ocean loading:

Given that there are established experts in this field providing the corrections to the public already (in some format or another), how should the SBL interact with these existing groups to maximize efficiency and minimize the duplication of efforts? Issues to be considered: validation of products, consistency of data formats, formal association ('accreditation') by the SBL...
 - * Non-tidal ocean loading:

There are no NRT observations of ocean bottom pressure available. Which models (CGM, ocean only, coupled ocean-atmosphere) are candidates for NRT bottom pressure? For research products, which ocean bottom pressure data sets can be used? Will GRACE provide reasonable estimates? Presentation on using modeled ocean-bottom pressure from JPL's ECCO model; R. Gross
 - Continental water storage data sets

In many regions, the observational data base is completely insufficient, therefore models have to be used. What models are available and how accurate are they?

 - * Models available by the Hydrology SB
 - * Milly and Shmakin
- Computational procedures (van Dam; Gegout, Plag, Kierulf)

We should first concentrate on the computation for SNREI models, i.e. the comparison of spherical harmonic to convolution sum approach. A brief look at the computation of LLNs for SNREI models is appropriated, too. If time allows, we could sketch solutions for spherically asymmetric models.
- WP6: Validation of products

What are the data sets to be used for validation of the loading products? What are the principle obstacles for the validation? For space geodetic time series, how can correlations of the load effects with other estimated parameters (station clocks and

troposphere) be handled? What can a comparison of the different techniques do for helping uncorrelate these signals? Would it help for validation to use the products in the station motion model? Should validation be organised through IERS and the Analysis Coordinator?

- WP7: Distribution (Plag)

What should be the prime tool for distribution? Web only? How can we ensure that the products are properly documented? What authorisation should products to be distributed on the SBL web page have? For the sake of efficiency, the SBL will probably be forced to distribute the products of others. What procedure does the SBL use to accredit these other sources?

5. SBL Web page (Plag)

Brief discussion on the structure and contents of the SBL web page. A distributed concept would make it easier for all members to contribute, but any item to be made available should somehow be authorised by the SBL members. What procedure should be established for that?

6. Work Schedule/Action Items (van Dam)

Decide on the initial focus - atmospheric loading is proposed. Who will be responsible for the following tasks which are required to get the operational part of the SBL up and running:

- *Data collection*
- *Algorithm testing*
 - *Spherical harmonic versus point loads*
 - *Deformation*
 - *Gravity*
- *Earth model*
- *Validation*

Experiment to be developed in cooperation with the IERS Analysis Coordinator
- *Reference Frames*

7. Meeting Plan (van Dam)

We should have a meeting at the EGS in Nice to discuss progress on the action items defined above. The GGFC is going to have a business meeting - can we prepare input to that meeting?

8. Miscellaneous